Lake Erie Area Watershed Act 167 Stormwater Management Plan Volume 2: Executive Summary

June 1996

Prepared for the:

Erie County Department of Planning

Prepared by:

Chester Engineers

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Prepared for the:

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LAKE ERIE AREA WATERSHED STORMWATER MANAGEMENT PLAN EXECUTIVE SUMMARY

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LAKE ERIE AREA WATERSHED STORMWATER MANAGEMENT PLAN

EXECUTIVE SUMMARY

INTRODUCTION

The stormwater management plan for the Lake Erie Area Watershed has been prepared by Erie County in order to meet the requirements of the Pennsylvania Storm Water Management Act (Act of October 4, 1978, P.L. 864 No. 167).

This law, commonly referred to as Act 167, requires that Pennsylvania counties prepare and adopt stormwater management plans for each watershed within its boundaries. It also requires that, within six months after a watershed plan has been adopted by a county and approved by the Pennsylvania Department of Environmental Protection (DEP), municipalities within the watershed must amend or enact ordinances to regulate development and other land alterations in accordance with the standards included in the adopted plan.

Each watershed plan must contain provisions to insure that development or activities in each municipality in the watershed do not adversely affect health, safety and property in other municipalities within the watershed and in basins to which the watershed is tributary.

In addition, every entity or individual who alters or develops land in a manner which affects stormwater runoff must implement stormwater control measures consistent with the adopted watershed plan.

The plan provides a foundation for future cooperative action which may lead to more effective and economical ways to manage stormwater flows.



RECOMMENDATIONS

Technical

In the absence of watershed wide planning for the regulation of stormwater flows, municipalities and developers have generally assumed that downstream harm could be avoided if stormwater runoff from a development site was not permitted to exceed the peak flows that left the area prior to development. A major finding of the engineering analyses upon which this stormwater management plan is based is that, in areas where significant new development will take place, the avoidance of downstream harm cannot always be assured by simply restricting discharges from new land development to the predevelopment rates. In fact, the use of stormwater detention facilities to reduce peak discharges can actually result in increases to downstream discharges. Such facilities limit peak discharges by extending the duration of time over which the stormwater leaves the site. This attenuation of maximum discharge rates may create conditions under which peak discharges from one or more tributary areas may occur simultaneously, thereby increasing total in-stream peak discharges.

In order to avoid such situations, this plan presents a standard for the control of stormwater runoff which is considers the interaction of runoff contributions from subareas or subbasins throughout the watershed and which considers the magnitude, duration and rate of stormwater flow together with the times at which peak rates of discharge arrive at various downstream locations. This standard, termed the "release rate percentage" combined with specified criteria define appropriate design storm characteristics required for computational purposes, are the primary technical plan elements which serve as the basis of this stormwater management plan and recommended municipal stormwater control ordinance and regulation provisions.

Management

The planning mandate of Act 167 can be achieved through the enactment and enforcement of municipal ordinances and regulations which incorporate the criteria and standards presented in the plan. The implementation of the regulations will require continuing involvement by all of the municipalities in the watershed and Erie County.

The plan describes the roles of local municipalities and the County in ongoing stormwater management activities. As is required by Act 167, the municipalities are given the responsibility for adopting and enforcing relevant stormwater control requirements. The County has been delegated the responsibility for updating the plan as specifically required by Act 167.



CONTENTS OF THE PLAN

The Stormwater Management Plan for the Lake Erie Area Watershed includes this document and a report titled <u>Lake Erie Area Watershed Act 167 Stormwater Management Plan</u> (main plan document), including appendices and additional unpublished supporting documentation.

Section 5 of Act 167 specifies that a watershed plan shall include the thirteen elements listed below.

- 1. A survey of existing runoff characteristics in small as well as large storms, including the impact of soils, slopes, vegetation and existing development.
- 2. A survey of existing significant obstructions and their capacities.
- 3. An assessment of projected and alternative land development patterns in the watershed and the potential impact on runoff quantity, velocity and quality.
- 4. An analysis of present development in flood hazard areas and its sensitivity to damage from future flooding or increased runoff.
- 5. A survey of existing drainage problems and proposed solutions.
- 6. A review of existing and proposed stormwater collection systems and their impacts.
- 7. An assessment of alternative runoff control techniques and their efficiency in the particular watershed.
- 8. An identification of existing and proposed State, Federal and local flood control projects located in the watershed and their design capacities.



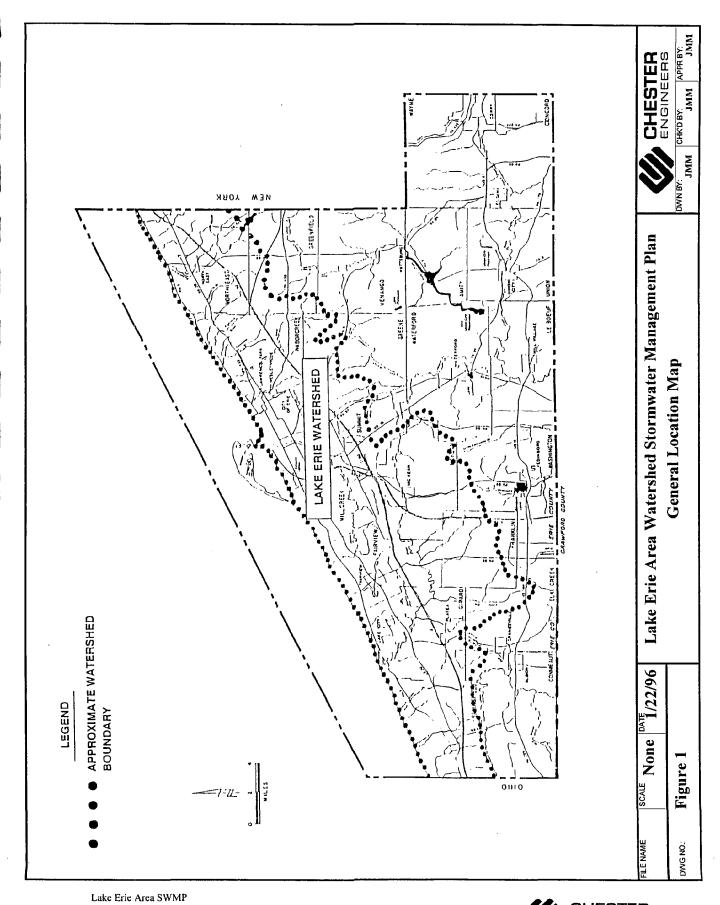
- 9. A designation and description of those areas to be served by stormwater collection and control facilities within a ten-year period.
- 10. An identification of flood plains within the watershed.
- 11. Criteria and standards for the control of stormwater runoff from development activities which are necessary to minimize dangers to property and life and carry out the purposes of Act 167.
- 12. Priorities for implementation of action within the plan.
- 13. Provisions for periodically reviewing, revising and updating the plan.

Each of these topics is addressed in the main plan document. Summaries of the findings and recommendations relative to these topics are provided in this Executive Summary in the order listed above.

EXISTING RUNOFF CHARACTERISTICS

General Information

The portion of the Lake Erie Area Watershed included in this project is located primarily within Erie County. Portions of the watershed lie in the State of Ohio to the west and the State of New York to the east. The designated watershed includes the areas within Erie County which drain to Lake Erie with the exception of the areas drained by Conneaut Creek and the Ashtabula River. These areas are contained in other designated watersheds and were not included in this plan. A general watershed map is provided in Figure 1 of this document and Plate III-1 in the main plan document. A listing of affected municipalities is provided in Table 1 of this document and Table III-1 in the main plan document.



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Table 1 Municipalities in the Lake Erie Area Watershed

Conneaut Township
Elk Creek Township
Erie City
Fairview Borough
Fairview Township
Franklin Township
Girard Borough
Girard Township
Greene Township
Greenfield Township
Harborcreek Township
Lake City Borough
Lawrence Park Township

McKean Borough McKean Township Millcreek Township North East Borough North East Township Platea Borough Springfield Township Summit Township Venango Township Washington Township Waterford Township Wesleyville Borough

The watershed, which spans approximately 44 miles in an east-west direction and extends between 2.5 and 12.7 miles north to south, encompasses approximately 98 square miles. The major tributaries in this watershed are listed in Table 2.

Table 2 Named Streams

Cascade Creek Mill Creek Crooked Creek Raccoon Creek Eightmile Creek Sevenmile Creek Elliots Run Scott Run Sixmile Creek Elk Creek **Brandy Run** Sixteenmile Creek Baker Creek Falk Run Goodman Run Trout Run Turkey Creek Halls Run Twelvemile Creek Lamson Run Little Elk Creek Twentymile Creek Porter Run Walnut Creek Fourmile Creek Bear Run Garrison Run Beaver Run Wilkins Run Marshall Run McDaniel Run



An extensive general description of the Lake Erie Area Watershed is presented in Section III of the main plan document.

Existing and potential future runoff characteristics were described using the Penn State Runoff Model (PSRM). PSRM is a computer model which was developed at the Pennsylvania State University in the mid-1970's. PSRM has gained broad acceptance as a stormwater runoff modeling tool, particularly with respect to Act 167 stormwater management planning. The model generates runoff flow information for selected points within a drainage system as the sum of flows contributed from tributary subareas. This is accomplished by estimating runoff generated in each defined subarea based upon the physical characteristics of the area and defined rainfall characteristics and then routing that runoff through the drainage system in accordance with the hydraulics of the channels and conduits comprising the system. A detailed discussion of the development and use of the PSRM is provided in Section IV of the main plan document.

The general input requirements of PSRM include the following parameters:

- 1. watershed representation data
 - A. tributary area (subbasin) physical features
 - B. tributary area (subbasin) hydrologic features
 - C. drainage (reach) system features
- 2. rainfall inputs
 - A. rainfall volumes
 - B. rainfall distribution

Subbasin Physical Characteristics

The first step in developing the PSRM input database was the delineation of subbasins. Each of 27 individual subwatersheds designated for modeling was further divided into subbasins. In this manner, a total of 1,498 subbasins were delineated. Subbasin boundaries were defined so as to as closely as practical produce hydrologically homogeneous areas as well as to adequately model hydrologically significant features. The size of the subbasins average 133 acres. Delineated subbasins are illustrated in Plate IV-1 of the main plan document.



The boundaries of the delineated subbasins were digitized and overlaid over elevation information obtained from digital elevation models obtained from the United States Geological Survey (U.S.G.S.). These data were analyzed using ARC/INFOtm image analysis and geographic information system (GIS) software to determine subbasin areas, land slopes, overland flow lengths and centroids.

Subbasin Hydrologic Characteristics

The principal subbasin characteristics of interest included the composite Soil Conservation Service (SCS) runoff curve number and percentage of impervious area for each subbasin. Percent of impervious area is defined as the percentage of the total subbasin area covered by surfaces which are essentially impermeable to water. The runoff curve number is an indication of the amount of surface runoff which may be expected to be produced as a result of a rainfall event. This runoff potential is influenced by land cover and soil conditions. The determination of impervious percentages and curve numbers required the classification of land cover and soil types.

Land cover / land use classifications were determined throughout the Lake Erie Area Watershed using remote sensing and digital image analysis techniques. Landsat thematic mapper multispectral digital data was used to provide the necessary land use and land cover information.

Impervious area statistics for each subbasin were estimated based upon the land cover and land use using the relationships of impervious area components of various land use/land cover classes developed and published by the U.S. Soil Conservation Service (SCS).

The spatial distribution of soils (aggregated by SCS hydrologic soil groups) was defined through the use of SCS soils maps and reports. The various soil types were digitized into the geographic system database. The various soil types were aggregated by appropriate hydrologic soil groups based upon SCS procedures.

GIS processing was used to digitally combine the land use and hydrologic soil group themes to yield a set of associations between surface type and soils units. These associations were referenced to the SCS information to attach the



appropriate runoff curve numbers. Further processing within the GIS calculated composite runoff curve numbers for each of the subbasins within the watershed.

All of the subbasin information necessary for PSRM modeling was represented in the GIS system as digitized themes. Once these data were resident in the GIS, the necessary analyses were performed to develop the required PSRM input data set. This data set is common to all subwatersheds and subbasins in the watershed and keyed to assigned subbasin identification numbers.

Stream Reach Hydrologic Characteristics

Important data requirements of the PSRM are estimates of times of travel in each of the modeled stream reaches and the bankfull capacity of each reach.

Travel time is calculated as the length of the reach divided by the average flow velocity. Stream reaches were defined in conjunction with the delineation of watershed subbasins as described previously. The length of each reach was determined by direct measurement from USGS topographic maps. Stream reach velocity estimates were based upon cross section information available from the detailed Flood Insurance Studies (FIS) completed within the watershed. These data was used in conjunction with empirical relationships between stream cross section measurements, discharge and mean velocity to produce velocity estimates for stream reaches for which no FIS information is available. Velocities for improved (i.e. channelized) stream reaches and major storm sewers and long culverts were calculated based upon reported and/or field measured dimensional and slope information. Estimated velocities were divided by measured lengths to produce travel time estimates for each defined stream reach. The estimation of bankfull capacities in the natural stream reaches was performed based upon field investigations and information reported in the literature.

Rainfall Characteristics

Rainfall depth, duration and frequency data were calculated using the Pennsylvania <u>Department of Transportation IDF Field Manual</u>. The SCS Type II storm distribution was selected for use as the means for defining the distribution of rainfall intensities within specific rainfall events.



SURVEY OF SIGNIFICANT OBSTRUCTIONS

Information describing the dimensions, condition and flow capacity of 278 separate stream obstructions was developed during the preparation of this plan. The location of these obstructions are illustrated in Plate III-4 contained in the main plan document. Data for describing the condition and dimensions of these obstructions were acquired from information contained in the 1981 Stormwater Management Plan supplemented by field visits and measurements.

The capacities of the obstructions were calculated based upon field measurements of critical dimensions and the application of procedures outlined in the U.S. Department of Transportation's publication <u>Hydraulic Design of Highway Culverts</u>. Calculated obstruction capacities presented in terms of adequacy as compared to estimated flood peaks return frequencies are presented in Appendix A of the main plan document.

ASSESSMENT OF POTENTIAL LAND DEVELOPMENT PATTERNS

Potential maximum future land development patterns in Erie County were obtained from the Erie County Department of Planning based upon current development trends together with the high population projection series as identified in the 1995 Erie County Demographic Analysis and Population Projection Report. Maximum development build out is utilized for stormwater management modeling purposes to assess the possible impact of potential land development patterns.

The possible impact of future land development without effective stormwater management controls was assessed using the Penn State Runoff Model. Runoff and stream flows in the watershed were modeled under the potential future land use pattern conditions for the 50 year storm event. This analysis indicated that potential future development could increase peak discharges by approximately an average of 13 percent at the mouths of the streams modeled

The result of this analysis is evidence that potential land development can have a significant impact upon stream flows. This points to the importance of instituting proper stormwater management controls within the watershed.



DEVELOPMENT IN FLOOD HAZARD AREAS

Stream reaches (or stream segments) identified as being prone to flooding under 100 year storm conditions in Flood Insurance Studies are identified previously in Plate III-3. Development in the areas adjacent to these flood prone areas was characterized by analyzing the current land use within 100 feet of the identified flood prone stream reaches. This was accomplished by calculating the amounts of land occupied by various land use classes that lie within the areas within 100 feet of each side of the identified stream reaches. This technique produced the approximate distribution of land use activities that lie in proximity to stream reaches identified as flood hazard areas in the Flood Insurance Studies. This information is summarized in Table 3.

Table 3
Distribution of Land Use in Flood Prone Areas

Land Cover / Land Use Class	Percent of Flood Prone Area
Residential	3.55
Commercial / Industrial	1.31
Mixed Residential / Commercial	6.25
Agriculture	17.83
Forest	67.07
Barren / Wetlands	3.80
Water	0.19

Information obtained from the watershed municipalities through the municipal questionnaire also provides an indication of the nature of development in areas affected by stormwater drainage problems. The municipalities were asked to indicate the types of properties affected by reported stormwater drainage problems and to estimate the approximate number of properties affected. Residential properties were identified as being affected by 76% of the problems for which the data was reported. Commercial properties were associated with 33% of the problems, agricultural or undeveloped in 20% of the cases, and industrial in 7% of the cases. Approximately 80% of the problems were reported to affect 10 or fewer properties and 20% were reported to affect more than 10 properties.



SURVEY OF DRAINAGE PROBLEMS

The delineated flood prone areas established by flood insurance studies relate primarily to stream flooding during major storm events. As such, they do not provide information concerning more minor flooding problems or stormwater problems separate from stream flooding such as street flooding, soil erosion or stormwater pollution instances.

Each of the municipalities in the watershed was contacted to solicit information relative to stormwater conditions which are perceived locally to be problems. In many cases, these problems may be somewhat localized, and related to local drainage limitations apart from stream flooding and may occur at a high frequency. Also, information relative to stormwater problems in addition to flooding (i.e., accelerated erosion, sedimentation and water pollution) was requested. Data obtained through these efforts was supplemented by a review of Flood Insurance Studies conducted in the watershed to produce the listing of identified stormwater problem areas. A total of 109 specific problem areas were reported in 15 of the municipalities in the watershed.

The predominant type of stormwater related problem reported by the municipalities is flooding. Over 70% of the individual problems were reported as flooding problems and approximately 20% of the problems were described as a combination of flooding accompanied by stream bank erosion and sedimentation. The remaining approximately 10% of the reported problems were attributed specifically to soil erosion and sedimentation.

Suggested solutions were offered for 70 of the reported problem areas. The suggested solutions include structural approaches such as constructing new or increasing the capacity of existing storm sewers, increasing the capacity of culverts, and constructing stormwater detention facilities. Also included are such remedial actions as stream dredging for the removal of accumulated silt, the clearing of debris from debris racks, culvert and bridge openings and the removal of obstructions from the stream bed. Improvements to existing storm sewer systems are the predominant types of solutions identified (51% of the cases). Efforts to clear the stream channel are offered as a solution to existing problems in roughly 29% of the cases. Providing erosion protection, increasing stream channel capacity, and employing runoff detention basins are identified as potential solutions to a much lesser extent. All of the suggested solutions offered restore or increase hydraulic capacities. It is important to note that the ultimate success of any of these efforts will require that the incremental increases in hydraulic capacity not be offset by future increases in stormwater runoff. The nature of the problems currently



encountered in the watershed and the types of solutions increase the importance of effective stormwater management in the watershed.

REVIEW OF STORMWATER COLLECTION SYSTEMS

The approximate locations of areas served by storm and combined sewer systems are presented in the main plan document. As one would expect, the areas served by piped stormwater collection systems largely correspond to the most densely developed areas in the watershed.

ASSESSMENT OF ALTERNATIVE RUNOFF CONTROL TECHNIQUES

The Lake Erie Area Stormwater Management Plan presents performance based standards for the management of runoff within the watershed. Within the context of these quantitative performance standards, this plan does not specify the use of particular runoff control techniques. Each developer is given relatively wide latitude within which to select one or a combination of several specific techniques through which to comply with the control standards.

Section VI of the main plan document contains descriptions of a variety of runoff reduction and control measures. These descriptions identify relative advantages and disadvantages of each of the control techniques as well as special considerations related to associated operation and maintenance requirements and potential water quality and public health considerations where appropriate.

IDENTIFICATION OF EXISTING AND PROPOSED FLOOD CONTROL PROJECTS

The main plan document lists eleven existing and thirteen proposed flood protection facilities reported in the watershed. The approximate locations of these facilities are illustrated in Plate III-5 (located in a map pocket accompanying the main plan document). There are no regional flood control projects within the study area. The existing flood protection facilities are designed to provide localized flood protection and include stream channelization, stream bank protection, storm sewers and debris racks. The proposed facilities would also address localized flooding problems and include stream channel improvements, stream bank protection, and debris rack construction.



DESIGNATION OF AREAS TO BE SERVED BY STORMWATER COLLECTION AND CONTROL FACILITIES IN THE FUTURE

The construction of storm sewers has been identified in the municipal questionnaires as a suggested solution to stormwater drainage problems in Fairview Township and Millcreek Township. While some storm sewer construction can be expected to occur in these and other currently developed areas in order to address localized stormwater drainage problems, most of the future storm sewer construction will occur as new areas of the watershed are developed. Therefore, future storm sewer system construction will occur as residential and commercial development progresses. The locations of such future storm sewer systems will correspond to the locations of future residential and commercial development.

IDENTIFICATION OF FLOOD PLAINS WITHIN THE WATERSHED

Delineated flood prone areas are identified on Plate III-3 of the main plan document.

CRITERIA AND STANDARDS FOR STORMWATER RUNOFF CONTROL

This section includes a description of the specific criteria and standards recommended for the control of stormwater runoff in the Lake Erie Area Watershed. These standards are based upon the analysis of runoff conditions in the watershed and are designed to carry out the purpose of Act 167. The standards and criteria developed for the Lake Erie Area Watershed area detailed in the *Model Stormwater Management Ordinance* contained in Appendix C of the main plan document and Appendix A of this Executive Summary.

Activities Covered

The following activities involving alteration or development of land are deemed to have possible effects upon storm water runoff characteristics and are included within the scope of this ordinance:

- 1. Subdivision
- 2. Land Development



- 3. Construction of new or additional impervious or semi-pervious surfaces (driveways, parking lots, etc.)
- 4. Diversion or piping of any natural or man-made stream channel
- 5. Installation, replacement or substantial repair of storm water systems or appurtenances
- 6. Earth moving involving 1.5 or more acres

Specific Technical Standa

Release Rate Percentage

The release rate percentage is the primary performance standard for the control of stormwater in the Lake Erie Area Watershed. Section V of the main plan document contains a discussion of the release rate percentage concept. Specific release rate percentages were assigned to each of 50 release rate areas comprising the watershed. These areas are delineated in Plate V-1 contained in the main plan document and appended hereto. Assigned release rate percentages for each area are illustrated on Plate V-1 and tabulated in Table 4. The assigned release rates are to be applied only to the 2, 10, and 25 year frequency storms. The basic post-development not to exceed pre-development peak discharge control standard is to be applied to the 100 year frequency storm.

The release rate percentage applies uniformly to all land development or alterations within an area which will result in an increase in post-development volumes and rates of runoff from a site. It is a tool for watershed level stormwater management developed to ensure that the application of runoff control plans for individual sites consider downstream runoff implications. To utilize the release rate percentage for a particular site in one of the release rate percentage areas, a developer should follow the general sequence of events listed below.

1. Compute the pre-development and post-development runoff for the specific site using an approved method for the designated control storms using no stormwater management techniques. If the post-development peak rate is less that or equal to the pre-development rate, the requirements of Act 167 and this plan have been met. If the post-development runoff rate exceeds the pre-development rate, proceed to Step 2.



- 2. Apply on-site stormwater management techniques to increase infiltration and reduce impervious surfaces. Recompute the post-development runoff rate for the control storms; and if the resulting post-development rate is less than or equal to the pre-development rate, the requirements of this plan have been met. Otherwise, stormwater flow attenuation techniques, including detention, retention will be required and the developer must proceed to Step 3.
- 3. Multiply the assigned release rate percentage for the subbasin times the predevelopment peak runoff rate to determine the allowable peak runoff rate from the development. Design the necessary detention/retention facilities or other flow attenuation features to meet the allowable runoff rate standard.

Table 4
Assigned Release Rate Percentages

Release Rate Area	Assigned Release Rate	Release Rate Area	Assigned Release Rate
Identification Number	Percentage	Identification Number	Percentage
<u> </u>			
1	100	26	90
2	80	27	80
3	90	28	80
4	80	29	90
5	70	30	80
6	90	31	80
7	80	32	90
8	80	33	80
9	90	34	90
10	80	35	70
11	80	36	80
12	80	37	80
13	80	38	90
14	80	39	90
15	70	40	80
16	90	41	90
17	90	42	70
18	80	43	80
19	80	44	80
20	80	45	70
21	90	46	90
22	70	47	80
23	100	48	80
24	80	49	80
25	80	50	70

Control Storms

Certain control storms must be used to analyze stormwater runoff under pre- and post- development conditions and for the design of stormwater control facilities. The rationale for selecting the 24 hour 2, 10, 25 and 100 year frequency storms is discussed in Section V of the main plan document. These control storms and associated rainfall depths are presented below.

Control Storm Rainfall Depths

24-Hour Precipitation Depth in Inches	
2.62	
3.75	
4.61	
6.19	

The Lake Erie Area Watershed Stormwater Management Plan specifies that the indicated rainfall volumes must be distributed over a 24 hour period according to the U.S. Soil Conservation Service Type II Rainfall Distribution Pattern.

Permissible Runoff Computation Techniques:

A number of techniques and methods have been used to estimate rates and volumes of runoff from land. The Lake Erie Area Watershed Stormwater Management Plan identifies The following permissible techniques to be used in plan implementation.

- Soil Conservation Service Urban Hydrology Method (TR-55)
- Soil Conservation Service Model (TR-20)
- U.S. Army Corps of Engineers Flood Hydrograph (HEC-1)
- Penn State Runoff Model (PSRM)



The Rational Method may be employed under specific limited circumstances if authorized by the municipal engineer responsible for control plan review.

This list of permissible techniques includes a cross section of the most commonly used computation methods entailing a range of approaches, levels of effort and required access to computer facilities. The list affords developers the opportunity to select from a suite of techniques. At the same time, the number of techniques with which the local reviewing engineer must be familiar is kept to a manageable number and the use of inapplicable, unproven, or inaccurate techniques is prohibited.

Stormwater Detention Facilities

If stormwater detention facilities are used, they must be designed such that the post-development peak runoff rates do not exceed the applicable subbasin release rate percentage for the 2, 10, and 25 year control storms. The facilities should be designed so that, during the 100 year storm event, the post-development peak discharge does not exceed the pre-development peak discharge rate for the same storm. All basins must be equipped with outlet structures which will control discharges to the specified rates and must include provisions to safely pass the peak flows associated with the 100-year storm without impairing the functioning of the facility. In addition, all runoff must be conveyed from its point of origin to the storage facility, whether located on the same property or elsewhere, in a manner which avoids adverse impacts such as flooding, erosion and scouring of land and drainage channels located between the point of origin and the detention facility

PRIORITIES FOR PLAN IMPLEMENTATION

The immediate and high priority items which must be completed to begin implementation of the plan include the following:

• Adoption or amendment of local ordinances: Each of the municipalities are required to adopt the stormwater management provisions contained in the *Model Stormwater Management Ordinance* presented in Appendix C of the main plan document and Appendix A of this Executive Summary within six months of the State's approval of the adopted plan.



• Establishment of review and enforcement procedures: The model ordinances call for the review of stormwater management plans prepared by individual developers and the enforcement of ordinance requirements. The responsibility for plan review and enforcement lies with the municipalities

The Lake Erie Area Stormwater Management Plan preparation process is complete with Erie County's adoption of the draft Plan and submission of the final Plan to DEP for approval. Subsequent activities to carry out the provisions of the Plan are considered by DEP to be part of the implementation of the Plan. The initial step of Plan implementation is DEP approval. Plan approval sets in motion the mandatory schedule of adoption of municipal ordinance provisions to implement the stormwater management criteria. Lake Erie Area Watershed municipalities will have six months from the date of DEP approval within which to adopt the necessary ordinance provisions. Failure to do so could result in the withholding of all state funds to the municipality(ies) per Act 167.

Additional implementation activities are the development of a local program to coordinate Chapter 105 and 106 permit application reviews and the development of a systematic approach for correction of existing storm drainage problem areas.

DEP Approval of the Plan

Upon adoption of the watershed plan by the County, the Plan is submitted to DEP for approval. The DEP review process involves determination that all of the activities specified in the approved Scope of Work have been satisfactorily completed in the Plan. Further, the Department will only approve the Plan if it determines the following:

- 1. That the Plan is consistent with municipal floodplain management plans, State programs which regulate dams, encroachments and other water obstructions, and State and Federal flood control programs; and
- 2. That the Plan is compatible with other watershed stormwater plans for the basin in which the watershed is located and is consistent with the policies and purposes of Act 167.



DEP action to either approve or disapprove the Plan must take place within ninety (90) days of receipt of the Plan by the Department. Otherwise, the Plan would be approved by default.

Municipal Adoption of Ordinance Provisions to Implement the Plan

The key ingredient for implementation of the Plan is the adoption of the necessary ordinance provisions by the Lake Erie Area watershed municipalities. Provided as part of this Plan is a model stormwater management ordinance to be used by the municipalities as a guide to making the necessary changes to their ordinances.

The method ultimately used to adopt the necessary ordinance provisions can be selected by each municipality based upon the recommendations of their solicitor. However, we recommend that the methods listed in Table 5 should be considered for use in adopting the necessary ordinance provisions.

The model stormwater management ordinance contains eleven articles containing recommendations relative to content and language. Much of the model ordinance is presented as guidance to the municipalities and can be modified to comply with local preferences and current practices. However, in order to accomplish the goals of Act 167 and this watershed stormwater management plan, it is important the specific content and language of the following key sections of the model ordinance be adopted essentially verbatim:

- Article I General Provisions
- Article II Stormwater Management Requirements
- Article IV, Section 405, Paragraph A Special Considerations in Bluff Areas
- Article VI, Section 602 General Exemptions
- Article VI, Section 602 Exemptions

The articles and sections of the model ordinance listed define the types of activities for which stormwater controls are required; define the specific stormwater control standards; and address the special protection needs of the coastal bluff areas. The general content of the other articles and sections of the model ordinance should be included in the



municipalities' ordinances, however, there is a greater opportunity for the customization of these sections to satisfy local preferences and procedures while accomplishing the overall goals of this plan.

Table 5
Recommended Ordinance Adoption Methods

Status of Current Ordinances	Municipalities in this Category	Recommended Adoption
Existing stormwater management ordinances are in effect.	Harborcreek Twp., McKean Twp., Millcreek Twp., North East Boro., North East Twp., Summit Twp.	Amend existing stormwater ordinance to comply with key model ordinance provisions and insure that the ordinance is properly incorporated by reference in the subdivision/land development and zoning ordinances.
Local subdivision/land development ordinances are in effect (no separate stormwater management ordinance).	Erie City, Fairview Boro., Fairview Twp., Franklin Twp., Girard Boro., Girard Twp., McKean Boro., Greene Twp., Greenfield Twp., Lake City Boro., Lawrence Park Twp., Springfield Twp., Venango Twp., Washington Twp., Waterford Twp.	Adopt a separate stormwater management ordinance patterned after the model stormwater management ordinance. Amend the existing subdivision/land development and zoning ordinances to incorporate the stormwater management ordinance by reference.
Erie County subdivision/land development ordinance is in effect (no separate stormwater management or ordinance)	Conneaut Twp., Elk Creek Twp., Platea Boro., Wesleyville Boro.	Adopt a separate stormwater management ordinance patterned after the model stormwater management ordinance and incorporate by reference in zoning ordinance (if one exists).

DEVELOPMENT OF A SYSTEMATIC APPROACH FOR CORRECTION OF EXISTING STORM DRAINAGE PROBLEMS

Correction of the existing storm drainage problem areas in the watershed is not specifically part of the Act 167 planning process. However, the development of the watershed plan has provided a framework for their correction for the following reasons: (1) existing storm drainage problems have been identified; (2) implementation of the runoff control criteria specified in the Plan will prevent the existing drainage problems from becoming worse (and prevent the creation of new drainage problem areas); and (3)



the hydrologic model developed to formulate the runoff control criteria could be used as an analytical tool for identifying engineering solutions to existing drainage problems.

With the above in mind, municipalities within the Lake Erie Area Watershed should include the following steps in their efforts to implement solutions to existing storm drainage problem areas:

- 1. Prioritize storm drainage problems within the municipality based up frequency of occurrence, potential for injury to persons or property, damage history, public perception of the problems and other appropriate criteria.
- 2. For the top priority drainage problems in the municipality, conduct detailed engineering evaluations to determine the exact nature of the problems, determine alternative solutions, provide cost estimates for the alternative solutions, and recommend a course of municipal action. The number of drainage problems to be evaluated by a municipality as a first cut from the priority list should be based on a schedule commensurate with completing engineering studies on all problem areas. The engineering studies should include consideration of the downstream effects of eliminating specific drainage problems so as to avoid transfer of problems progressively downstream.
- 3. On the priority and cost basis, incorporate implementation of recommended solutions to the drainage problems in the annual municipal capital or maintenance budgets as funds are available.

The above stated procedure for dealing with existing storm drainage problems is not a mandatory action placed on municipalities with the adoption of the watershed plan. Rather, it represents a systematic method to approach the problems uniformly throughout the watershed and attempt to improve the current runoff situation in the basin. The key elements involved in the success of the remedial strategy will be the dedication of the municipalities to construct the corrective measures and the consistent and proper application of the runoff control criteria specified in the Plan. The latter element is essential to ensure that remedial measures do not become obsolete (under-designed) by increases in peak flows with development.



PROVISIONS FOR REVIEWING, REVISING AND UPDATING THE PLAN

Erie County has been provided with data describing the physical system of the Lake Erie Area Watershed which affect hydrology and hydraulics. Principal types of data and information provided include: Penn State Runoff Models for the watershed and input data for the runoff models which reflect existing hydrologic and hydraulic conditions. These materials served as the basis for the development of the standards and criteria presented in the Plan. Major changes to the hydrologic and hydraulic conditions in the watershed as reflected in the PSRM input data files may warrant changes in the resulting standards and criteria.

These data files can be updated to reflect: 1) changes in land use / land cover which may affect runoff conditions; 2) changes to streams, major culverts and other flow conduits which may materially affect watershed hydraulics, and 3) the construction of regional detention facilities which may significantly affect watershed peak discharge times and associated release rate percentages. Once the input data files have been updated, the PSRM can be run under the new conditions to identify needed changes (if any) to the standards and criteria presented in this Plan.

Under the requirements of Act 167 the Plan is to be updated at intervals not exceeding five years. More frequent updating of the Plan may be warranted if significant changes in the watershed occur sooner. Factors which would warrant an update prior to the statutory data may include the following:

- Changes to major stream segments or primary stormwater conveyance elements which serve to affect watershed hydraulics such that the potential for damage is materially changed or peak discharge timings are significantly changed.
- Regional detention facilities are constructed such that changes to the release rate percentages assigned to tributary subbasins are warranted.
- Extensive changes to land use occur to the extent that significant changes to subbasin times of concentration and runoff result.



• Peculiarities in the application of specific standards and criteria are experienced which interfere with the effective and equitable administration of the Plan requirements.

All of the involved agencies (County and municipalities) should monitor conditions in the watershed. In the event that any of the above listed conditions (or others) arise, the County should proceed with updating the Plan as warranted.

Appendix A Model Stormwater Management Ordinance





MODEL STORMWATER MANAGEMENT PROVISIONS FOR STORMWATER MANAGEMENT ORDINANCE

ARTICLE I GENERAL PROVISIONS

Section 101 - Purpose

These regulations have the following general purposes and objectives:

- 1. To assure safe management of stormwater runoff resulting from land alteration and disturbance activities in accordance with watershed stormwater management plans adopted pursuant to the Pennsylvania Storm Water Management Act (Act 167 of 1978, as amended).
- 2. To utilize and preserve the existing natural drainage systems and to preserve the flood-carrying capacity of streams.
- 3. To encourage natural infiltration of rainfall to preserve groundwater supplies and stream flows.
- 4. To provide for adequate maintenance of all permanent stormwater management structures in the municipality.

Section 102 - Statutory Authority

The municipality is empowered to regulate land use activities that affect runoff by the authority of the Act of October 4, 1978, P.L. 864 (Act 167), The "Storm Water Management Act" as amended by Act 63 and [insert reference to the applicable Municipal code].

Section 103 - Applicability

The following activities involving alteration or development of land are deemed to have possible effects upon storm water runoff characteristics and are included within the scope of this ordinance:

- 1. Subdivision
- 2. Land Development
- 3. Construction of new or additional impervious or semi-pervious surfaces (driveways, parking lots, etc.)
- 4. Diversion or piping of any natural or man-made stream channel
- 5. Installation, replacement or substantial repair of storm water systems or appurtenances



6. Earth moving involving 1.5 or more acres

Section 104 - Repealer

This ordinance shall repeal all other ordinances, or parts thereof, which are contrary to or conflict with the provisions of this ordinance to the extent necessary to give this ordinance full force and effect.

Section 105 - Severability

Should any section or provision of this ordinance be declared invalid by a court of competent jurisdiction, such decision shall not affect the validity of this ordinance as a whole or any other part hereof; the parts or sections remaining shall remain in effect as if the part of the section declared unconstitutional had never been a part of this ordinance.

Section 106 - Liability Disclaimer

- 1. Neither the granting of any approval under the provisions of this Article, nor the compliance with the provisions of this Article, or with any condition imposed by a municipal official hereunder, shall relieve any person from any responsibility for damage to persons or property resulting therefrom, or as otherwise imposed by law, nor impose any liability upon the municipality for damages to persons or property.
- 2. The granting of a permit which includes any stormwater management facilities shall not constitute a representation, guarantee or warranty of any kind by the municipality, or by an official, employee, solicitor, and consulting engineer thereof, of the practicability or safety of any structure, use or other plan proposed, and shall create no liability upon or cause of action against any official, employee, or designated representative for any damage that may result pursuant thereto.



ARTICLE II DEFINITIONS

Act: The Storm Water Management Act (Act of October 4, 1978, P.L. 864 No. 167; 32 P.S. Sections 680.1-680.17, as amended by Act of May 24, 1984, No. 63).

Applicant: A landowner or developer who has filed an application for development including his/her heirs, successors and assigns.

Channel: A perceptible natural or artificial waterway which periodically or continuously contains moving water or which forms a connecting link between two bodies of water. It has a definite bed and banks which confine the water.

Conservation District: The Erie County Conservation District.

County: Erie County, Pennsylvania

Culvert: A closed conduit for the free passage of surface drainage under a highway, railroad, canal or other embankment.

Design criteria: (1) Engineering guidelines specifying construction details and materials. (2) Objectives, results, or limits which must be met by a facility, structure, or process in performance of its intended functions.

Design storm: (see storm frequency)

Detention: The slowing, dampening or attenuating of runoff flows entering the natural drainage pattern or storm drainage system by temporarily holding water on a surface area in a detention basin or within the drainage system.

Detention pond or basin: An basin or reservoir, usually small, constructed to impound or retard surface runoff temporarily.

Developer: The person, persons, or any corporation, partnership, association, or other entity or any responsible person therein or agent therefor that undertakes the activities associated with changes in land use. The term "developer" is intended to include but not necessarily be limited to the term "subdivider", "owner", and "builder" even though the individuals involved in successive stages of a project may vary.

Development: Any activity, construction, alteration, change in land use or practice that affects stormwater runoff characteristics.

Discharge: The flow or rate of flow from a canal, conduit, channel or other hydraulic structure.



Drainage: In general, the removal of surface water from a given area. Commonly applied to surface water and ground water.

Drainage Area: (1) The area of a drainage basin or watershed, expressed in acres, square miles, or other unit of area. Also called catchment area, watershed, river basin. (2) The area served by a sewer system receiving storm and surface water, or by a watercourse.

Encroachment: Any structure or activity which in any manner changes, expands or diminishes, the course, current or cross section of any watercourse, floodway or body of water.

Erosion: Wearing away of the lands by running water, glaciers, winds and waves.

Erosion control: The application of measures to reduce erosion of land surfaces.

Ground Cover: Materials covering the ground surface,

Ground Water: Subsurface water occupying the saturation zone, from which wells and springs are fed.

Ground Water Recharge: Replenishment of ground water naturally by precipitation or runoff or artificially by spreading or injection.

Impervious: Not allowing or allowing only with great difficulty the movement of water; impermeable.

Infiltration: (1) The flow or movement of water through the interstices or pores of a soil or other porous medium. (2) The absorption of liquid by the soil.

Land Development: Any of the following activities:

- (1) the improvement of one lot or two or more contiguous lots, tracts or parcels of land for any purpose involving: (a) a group of two or more residential or non-residential buildings, whether proposed initially or cumulatively, or a single non-residential building on a lot or lots regardless of the number of occupants or tenure; or (b) the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features;
- (2) a subdivision of land;
- (3) development in accordance with Section 503 (1.1) of the Pennsylvania Municipalities Planning Code.

Land Disturbance: Any activity involving the changing, grading, transportation, fill and any other activity which causes land to be exposed to the danger of erosion.

Maintenance: The upkeep necessary for efficient operation of physical properties.



Municipality: (name of municipality), Erie County

Municipal engineer: A professional engineer licensed in the Commonwealth of Pennsylvania, duly appointed by the (name of municipality).

Natural Stormwater Runoff Regime: A watershed where natural surface configurations, runoff characteristics and defined drainage conveyances have attained the conditions of equilibrium.

Outfall: (1) The point, location or structure where drainage discharges from a sewer, drain or other conduit. (2) The conduit leading to the ultimate discharge point.

Outlet Control Structure: The means of controlling the relationship between the headwater elevation and the discharge, placed at the outlet or downstream end of any structure through which water may flow.

Performance Standard: A standard which establishes an end result or outcome which is to be achieved but does not prescribe specific means for achieving it.

Peak Flow: Maximum flow.

Pennsylvania DEP: Pennsylvania Department of Environmental Protection.

Release Rate Percentage: The watershed factor determined by comparing the maximum rate of runoff from a subbasin to the contributing rate of runoff to the watershed peak rate at specific points of interest.

Retention Pond: A basin, usually enclosed by artificial dikes, that is used to retard stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate.

Return Period: The average interval in years over which an event of a given magnitude can be expected to recur.

Runoff: That part of precipitation which flows over the land.

Runoff Characteristics: The surface components of any watershed which affect the rate, amount, and direction of stormwater runoff. These may include but are not limited to: vegetation, soils, slopes and man-made landscape alterations.

SCS: U.S. Department of Agriculture Soil Conservation Service.

Sediment: Mineral or organic solid material that is being transported or has been moved from its site of origin by air, water or ice and has come to rest.

Sedimentation: The process by which mineral or organic matter is accumulated or deposited by moving water, wind or gravity.



Storage Facility: (See detention pond and retention pond).

Storm Frequency: The average interval in years over which a storm event of a given precipitation volume can be expected to occur.

Storm Sewer: A sewer that carries intercepted surface runoff, street water and other drainage but excludes domestic sewage and industrial waste.

Stormwater: That portion of precipitation which runs over the land.

Stormwater Collection System: Natural or man-made structures that collect and transport stormwater through or from a drainage area to the point of final outlet including, but not limited to, any of the following: conduits and appurtenant features, canals, channels, ditches, streams, culverts, streets, and pumping stations.

Stormwater Management Plan: The plan for managing stormwater runoff adopted by Erie County as required by the Storm Water Management Act.

Subdivision: The division or redivision of a lot, tract or parcel of land by any means into two or more lots, tracts, parcels or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, partition by the court for distribution to heirs or devisees, transfer of ownership or building or lot development, provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than 10 acres, not involving any new street or easement of access or any residential dwelling, shall be exempted.

Swale: A low-lying stretch of land which gathers or carries surface water runoff.

Watercourse: Any channel for conveyance of surface water having a defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

Watershed: The entire region or area drained by a river or other body of water whether natural or artificial. A "designated watershed" is an area delineated by the Pennsylvania DEP and approved by the Environmental Quality Board for which counties are required to develop watershed stormwater management plans.



ARTICLE III STORMWATER MANAGEMENT REQUIREMENTS

Section 301 - Stormwater Management Districts

- A. For purposes of stormwater management, the municipality of ______is divided into the following stormwater management districts:
 - 1. Lake Erie / Elk Creek Watershed

(Note: List each additional DEP-designated watershed that may encompass portions of the municipality (French Creek, Cussewago Creek, Conneaut Creek, and/or Ashtabula River watersheds).)

One or more of these districts may be further subdivided into subareas which have similar hydrological characteristics and drain to a common point.

B. The location and boundaries of the watershed(s) and subareas are shown on the "Municipal Stormwater Management District Map" which is hereby adopted as a part of this section.

(Note: Map can be included as an appendix to the ordinance or copies made available in the municipal offices.)

Section 302 - General Standards

B. No discharge of toxic materials shall be permitted into any stormwater management system. Where required by federal and state regulation, the landowner or developer shall be responsible for obtaining an NPDES permit for stormwater discharges.

Section 303 - Watershed Standards: Designated Lake Erie / Elk Creek Stormwater Management Watershed

(Note: Municipalities that include more than one DEP designated watershed will need to add provisions following this section for other designated watersheds.)

- A. The stormwater performance standards contained in this section are intended to implement the standards and criteria contained in the Lake Erie Area Watershed Stormwater Management Plan, adopted and approved in accordance with the Pennsylvania Storm Water Management Act. If there is any discrepancy between the provisions of this section and the standards and criteria of the plan, or if the watershed plan is subsequently amended, then the standards/criteria of the amended watershed plan shall govern.
- B. Storm Frequencies: Stormwater management facilities on all development sites shall control the peak stormwater discharge for the 2-, 10-, 25- and 100-year storm



frequencies. The Soil Conservation Service (SCS) 24-hour, Type II Rainfall Distribution shall be used for analyzing stormwater runoff for both pre- and post-development conditions. The 24-hour total rainfall for these storm frequencies in the watershed are:

Storm Frequency	Rainfall Depth (inches)				
2-year	2.62				
10-year	3.75				
25-year	4.61				
100-year	6.19				

C. Calculation Methods

- 1. Development Sites: For the purpose of computing peak flow rates and runoff hydrographs from development sites, calculations shall be performed using one of the following: SCS publications, Technical Release (TR) 55 or 20, HEC I or Penn State Runoff Model (PSRM) or Modified Rational Method. Under special circumstances other computation methods may be used subject to the approval of the municipality.
- 2. Stormwater Collection/Conveyance Facilities: For the purposes of designing storm sewers, open swales and other stormwater runoff collection and conveyance facilities, the Rational Method or other method as approved by the municipality may be applied. Rainfall intensities for design should be obtained from the Pennsylvania Department of Transportation rainfall charts.
- 3. Routing of hydrographs through detention / retention facilities for the purpose of designing those facilities shall be accomplished using the Modified-Puls Method or other recognized reservoir routing method subject to the approval of the municipality.
- 4. Predevelopment Conditions: Predevelopment conditions shall be assumed to be those which exist on any site at the time prior to the commencement of development activities. SCS runoff curve numbers selected for use in the calculations shall accurately reflect existing conditions subject to the approval of the municipality. At its discretion, the municipality may direct that hydrologic conditions for all areas with pervious cover (i.e., fields, woods, lawn areas, pastures, cropland, etc.) shall be assumed to be in "good" condition, and the lowest recommended SCS runoff curve number (CN) shall be applied for all pervious land uses within the respective range for each land use and hydrologic soil group.



D. Release Rate Percentage

1. Definition: The release rate percentage defines the percentage of the predevelopment peak rate of runoff that can be discharged from an outfall on the site after development under the 2, 10, and 25 year storm conditions. Under all circumstances, a 100% release rate percentage shall be applied to the 100 year frequency storm whether or not lower reduced release rate percentages are specified for the 2, 10 and 25 year return frequency storms. The assigned release rate percentage for each subarea applies uniformly to all land development or alterations within the subarea. A listing of the release rate percentage by subarea appears in Appendix __ of this ordinance; the subareas are delineated on the Release Rate Percentage Maps.

2. Procedure for Use

- (a) Identify the specific subarea in which the development site is located from the watershed map and obtain the subarea release rate percentage from Appendix A and the appropriate Release Rate Percentage Map.
- (b) Compute the pre- and post-development runoff hydrographs for each stormwater outfall on the development site using an acceptable calculation method for the 2-, 10-, 25- and 100-year storms. Apply no on-site detention for stormwater management but include any techniques to minimize impervious surfaces and/or increase the time of concentration for stormwater runoff flowing from the development site. If the post-development peak runoff rate and the runoff volume are less than or equal to the predevelopment peak runoff rate and volume, then additional stormwater control shall not be required at that outfall.

If the post-development peak runoff rate and volume are greater than the predevelopment peak runoff rate and volume, then stormwater detention shall be required. The capacity of the detention facility shall be calculated by multiplying the predevelopment rate of runoff from the 2, 10, and 25 year frequency storm by the subarea release rate percentage and the predevelopment runoff rate from the 100 year storm event by 100% to determine the maximum allowable releases from any detention facility.

E. Exception Areas

- 1. Exceptions to the peak discharge standards will be considered only in the following instances:
 - (a) In the Lake Erie Area Watershed: only in instances where the discharge from the development site occurs directly to Lake Erie, an



adequately sized storm or combined sewer which discharges directly into Lake Erie, or through a properly sized and designed regional stormwater detention facility.

(Note: Municipalities that include more than one DEP designated watersheds will need to add conditions where exceptions may be appropriate in each watershed.)

2. The analyses of storm or combined sewers and/or regional detention facilities as are necessary to demonstrate their adequacy for the proposed discharges shall be completed by the applicant using methods and procedures as directed by the municipality.

Section 304 - Watershed Standards: Areas Outside Watersheds for which Act 167 Stormwater Management Planning Has Not Been Completed

(Note: This section is optional. It presents a method through which interim stormwater controls can be applied to areas of the municipality that are not within watersheds for which Act 167 Watershed Stormwater Management Planning has been completed. If the municipality has no interest in applying stormwater management controls in these areas, this section may be omitted.)

- A The stormwater management performance standards in this section are intended to apply basic stormwater standards in areas of the municipality for which Act 167 Stormwater Management Planning has not been completed.
- B. Storm Frequencies: Stormwater management facilities on all development sites shall control the peak stormwater discharge for the 2-, 10-, 25- and 100-year storm frequencies. The Soil Conservation Service (SCS) 24-hour, Type II Rainfall Distribution shall be used for analyzing stormwater runoff for both pre- and post-development conditions. The 24-hour total rainfall for these storm frequencies in the watershed are:

Storm Frequency	Rainfall Depth (inches)				
2-year	2.62				
10-year	3.75				
25-year	4.61				
100-year	6.19				

C. Calculation Methods

1. Development Sites: For the purpose of computing peak flow rates and runoff hydrographs from development sites, calculations shall be performed using one of the following: SCS publications, Technical Release (TR) 55 or 20, HEC I or Penn State Runoff Model (PSRM) or Modified Rational



- Method. Under special circumstances other computation methods may be used subject to the approval of the municipality.
- 2. Stormwater Collection/Conveyance Facilities: For the purposes of designing storm sewers, open swales and other stormwater runoff collection and conveyance facilities, the Rational Method or other method as approved by the municipality may be applied. Rainfall intensities for design should be obtained from the Pennsylvania Department of Transportation rainfall charts.
- 3. Routing of hydrographs through detention / retention facilities for the purpose of designing those facilities shall be accomplished using the Modified-Puls Method or other recognized reservoir routing method subject to the approval of the municipality.
- 4. Predevelopment Conditions: Predevelopment conditions shall be assumed to be those which exist on any site at the time prior to the commencement of development activities. SCS runoff curve numbers selected for use in the calculations shall accurately reflect existing conditions subject to the approval of the municipality. At its discretion, the municipality may direct that hydrologic conditions for all areas with pervious cover (i.e., fields, woods, lawn areas, pastures, cropland, etc.) shall be assumed to be in "good" condition, and the lowest recommended SCS runoff curve number (CN) shall be applied for all pervious land uses within the respective range for each land use and hydrologic soil group
- D. Post-development rates of runoff shall not exceed the peak rates of runoff prior to development for the 2, 10, 25, and 100 year design storms.



ARTICLE IV DESIGN CRITERIA FOR STORMWATER MANAGEMENT CONTROLS

Section 4.01 - General criteria

- A. Applicants may select runoff control techniques, or a combination of techniques, which are most suitable to control stormwater runoff from the development site. All controls shall be subject to approval of the municipal engineer. The municipal engineer may request specific information on design and/or operating features of the proposed stormwater controls in order to determine their suitability and adequacy in terms of the standards of this ordinance.
- B. The applicant should consider the effect of the proposed stormwater management techniques on any special soil conditions or geological hazards which may exist on the development site. In the event such conditions are identified on the site, the municipal engineer may require in-depth studies by a competent geotechnical engineer. Not all stormwater control methods may be advisable or allowable at a particular development site.
- C. In developing a stormwater management plan for a particular site, stormwater controls shall be selected according to the following order of preference:
 - 1. minimization of impervious surfaces during site design
 - 2. flow attenuation by use of open vegetated swales and natural depressions
 - 3. stormwater detention/retention structures
- D. Infiltration practices shall be used to the extent practicable to reduce volume increases and promote groundwater recharge. A combination of successive practices may be used to achieve the applicable minimum control requirements. Justification shall be provided by the applicant for rejecting each of the preferred practices based on actual site conditions.

Section 402 - Criteria for Infiltration Systems

- A. Infiltration systems shall be sized and designed based upon local soil and ground water conditions.
- B. Infiltration systems greater than three (3) feet deep shall be located at least ten (10) feet from basement walls.
- C. Infiltration systems shall not be used to handle runoff from commercial or industrial working or parking areas. This prohibition does not extend to roof areas



- which are demonstrated to be suitably protected from the effects of the commercial/industrial activities.
- D. Infiltration systems may not receive runoff until the entire drainage area to the system has received final stabilization.
- E. The stormwater infiltration facility design shall provide an overflow system with measures to provide a non-erosive velocity of flow along its length and at the outfall.

Section 403 - Criteria for Flow Attenuation Facilities

- A. If flow attenuation facilities are employed to assist in the control of peak rates of discharge, their effects must be quantified using the SCS Technical Release (TR) 55 Urban Hydrology for Small Watersheds or other approved method. The effects of the flow attenuation facilities on travel time should be reflected in the calculations.
- B. Flow attenuation facilities such as swales and natural depressions should be properly graded to ensure positive drainage and avoid prolonged ponding of water.
- C. Swales shall be properly vegetatively stabilized or otherwise lined to prevent erosion.
- E. Swales shall be designed according to the recommendations contained in the Commonwealth of Pennsylvania Erosion and Sediment Pollution Control Program Manual.

Section 404 - Criteria for Stormwater Detention Facilities

- A. If detention facilities are utilized for the development site, the facility(ies) shall be designed such that post-development peak runoff rates from the developed site are controlled to those rates defined by the subarea release rate percentage for the 2-, 10-, 25, and 100-year storm frequencies.
- B. All detention facilities shall be equipped with outlet structures to provide discharge control for the four (4) designated storm frequencies. Provisions shall also be made to safely pass the post-development 100-year storm runoff without damaging or impairing the continued function of the facilities. Should any stormwater management facilities be regulated by PA DEP Chapter 105 regulations, the facility shall be designed in accordance with those regulations and meet the regulations concerning dam safety.
- C. Shared-storage facilities which provide detention of runoff for more than one development site within a single subarea are encouraged wherever feasible and provided such facilities meet the criteria contained in this section. In addition, runoff from the development sites involved shall be conveyed to the facility in a



- manner that avoids adverse impacts (such as flooding or erosion) to channels and properties located between the development site and the shared-storage facilities.
- D. Where detention facilities will be utilized, multiple use facilities, such as wetlands, lakes, ballfields or similar recreational/open space uses are encouraged wherever feasible, subject to the approval of the municipality and compliance with the Pennsylvania Department of Environmental Protection's Chapter 105 regulations.
- E. Other considerations which should be incorporated into the design of the detention facilities include:
 - 1. Inflow and outflow structures shall be designed and installed to prevent erosion and bottoms of impoundment type structures should be protected from soil erosion.
 - 2. Control and removal of debris both in the storage structure and in all inlet or outlet devices shall be a design consideration.
 - 3. Inflow and outflow structures, pumping stations, and other structures shall be designed and protected to minimize safety hazards.
 - 4. The water depth at the perimeter of a storage pond should be limited to that which is safe for children. Restriction of access (fence, walls, etc.) may be necessary depending on the location of the facility and the maximum depths of water.
 - 5. Side slope of storage ponds shall not exceed a ratio of two-and-one-half to one (2.5:1) horizontal to vertical dimension.
 - 6. Landscaping shall be provided for the facility which harmonizes with the surrounding area.
 - 7. Facilities shall be located to facilitate maintenance, considering the frequency and type of equipment that will be required.
 - 8. Bottoms of detention basins should be graded with sufficient slope to provide positive surface drainage. A subdrainage system may be required depending on the location of the pond bottom relative to groundwater levels.
 - 9. Fencing shall be provided if required by the municipality.

Section 405 - Criteria for Collection/Conveyance Facilities

(Note: The municipality should review the specific requirements of this section for consistency with its existing requirements and local preferences. Specific design and construction details suggested here may be modified upon recommendation of the



municipal engineer in order to reflect the municipality's current standard practices, local conditions and preferences.)

- A. All stormwater runoff collection or conveyance facilities, whether storm sewers or other open or closed channels, shall be designed in accordance with the following basic standards:
 - 1. All sites shall be graded to provide drainage away from and around the structure in order to prevent any potential flooding damage.
 - 2. Lots located on the high side of streets shall extend roof and French drains to the curb line storm sewer (if applicable). Low side lots shall extend roof and french drains to a stormwater collection/conveyance/control system or natural watercourse in accordance with the approved stormwater management plan for the development site.
 - 3. Collection/conveyance facilities should not be installed parallel and close to the top or bottom of a major embankment to avoid the possibility of failing or causing the embankment to fail.
 - 4. All collection/conveyance facilities shall be designed to convey the 25-year storm peak flow rate from the contributing drainage area and to carry it to the nearest suitable outlet such as a stormwater control facility, curbed street, storm sewer or natural watercourse.
 - 5. Where drainage swales or open channels are used, they shall be suitably lined to prevent erosion and designed to avoid excessive velocities.
- B. In Lake Erie coastal bluff areas (as defined by the Pennsylvania Bluff Recession and Setback Act of 1980), special care should be taken to properly direct, collect, and discharge stormwater runoff so as to protect against bluff recession and erosion. The developer's activities shall be coordinated with the municipality to effect such protections. The Pennsylvania Department of Environmental Protection Division of Coastal Programs may be able to provide guidance in the form of technical assistance.

(Note: This paragraph should be contained in ordinances adopted by municipalities that encompass coastal bluff areas.)

- C. Wherever storm sewers are proposed to be utilized, they shall comply with the following criteria:
 - 1. Where practical, designed to traverse under seeded and planted areas. If constructed within ten (10) feet of road paving, walks or other surfaced areas, drains shall have a narrow trench and maximum compaction of backfill to prevent settlement of the superimposed surface or development.



- 2. Preferably installed after excavating and filling in the area to be traversed is completed, unless the drain is installed in the original ground with a minimum of three (3) feet cover and/or adequate protection during the fill construction.
- 3. Designed: (1) with cradle when traversing fill areas of indeterminate stability, (2) with anchors when gradient exceeds twenty (20) percent, and (3) with encasement or special backfill requirements when traversing under a paved area.
- 4. Designed to adequately handle the anticipated stormwater flow and be economical to construct and maintain. The minimum pipe size shall be fifteen (15) inches in diameter.
- 5. Drain pipe, trenching, bedding and backfilling requirements shall conform to the requirements of the municipality and/or applicable PennDOT Specifications, Form 408.
- 6. All corrugated metal pipe shall be polymer coated, and with asbestos bonding and paved inverts where prone to erode. Pipe within a municipal right-of-way shall be reinforced concrete pipe with a minimum diameter of 15 inches.
- 7. Storm inlets and structures shall be designed to be adequate, safe, self-cleaning and unobtrusive and consistent with municipal standards.
- 8. Approved grates shall be designed for all catch basins, stormwater inlets and other entrance appurtenances.
- 9. Manholes shall be designed so that the top shall be at finished grade and sloped to conform to the slope of the finished grade. Top castings of structures located in roads or parking areas shall be machined or installed to preclude "rattling."
- 10. Where a proposed storm sewer connects with an existing storm sewer system, the applicant shall demonstrate that sufficient capacity exists in the downstream system to handle the additional flow.
- 11. Storm sewer outfalls shall be equipped with energy dissipation devices to prevent erosion and conform with applicable requirements of the Pennsylvania DEP for stream encroachments (Chapter 105 of Pennsylvania DEP Rules and Regulations).



ARTICLE V EROSION AND SEDIMENTATION CONTROLS

Section 501 - Erosion and Sedimentation Control Requirements

A. An erosion/sedimentation plan shall be prepared for each development site in accordance with the Pennsylvania Erosion/Sedimentation Regulations (25 PA Code, Chapter 102) and the standards and guidelines of the County Conservation District.

(Note: If the municipality has a grading or other ordinance which contains its erosion/sedimentation provisions, then it should be referenced here.)

B. Proposed erosion/sedimentation measures shall be submitted with the stormwater management plan.



ARTICLE VI MAINTENANCE OF STORMWATER MANAGEMENT CONTROLS

Section 601 - Maintenance Responsibilities

- A. The maintenance plan for stormwater management facilities located on the development site shall establish responsibilities for the continuing operation and maintenance of all proposed stormwater control facilities, consistent with the following principals:
 - 1. If a development consists of structures or lots which are to be separately owned and in which streets, storm sewers and other public improvements are to be dedicated to the municipality, stormwater control facilities should also be dedicated to and maintained by the municipality.
 - 2. If a development site is to be maintained in single ownership or if storm sewers and other public improvements are to be privately owned and maintained, then the ownership and maintenance of stormwater control facilities should be the responsibility of the owner or private management entity.
- B. The governing body, upon recommendation of the municipal engineer, shall make the final determination on the continuing maintenance responsibilities prior to final approval of the stormwater management plan. The governing body reserves the right to accept the ownership and operating responsibility for any or all of the stormwater management controls.

Section 602 - Maintenance Agreement for Privately Owned Stormwater Facilities

- A. Prior to final approval of the site's stormwater management plan, the applicant and municipality shall execute a maintenance agreement covering all stormwater control facilities which are to be privately owned. The maintenance agreement shall be recorded with the final subdivision/land development plan for the site. The agreement shall stipulate that:
 - 1. All facilities shall be maintained in accordance with the approved maintenance schedule and in a safe and attractive manner.
 - 2. Easements and or rights-of-way shall be conveyed to the municipality to assure access for periodic inspections by the municipality and maintenance if required.
 - 3. The name, address and telephone number of the person or company responsible for maintenance activities shall be filed with the municipality. In the event of a change, new information will be submitted to the municipality within ten (10) days of the change.



- 4. If the facility owner fails to maintain the stormwater control facilities, the municipality may perform the necessary maintenance work or corrective work following due notice by the municipality to the facility owner to correct the problem(s). The facility owner shall reimburse the municipality for all costs.
- B. Other items may be included in the agreement where determined necessary to guarantee the satisfactory maintenance of all facilities.

Section 603 - Municipal Stormwater Maintenance Fund

(Note: This provision illustrates one way a municipality could establish a special fund to finance its maintenance and inspection activities for stormwater retention/detention facilities. It is an optional provision of the ordinance. If a municipality is interested in establishing such a fund, it is recommended that it consult with its solicitor for legal requirements and procedures.)

- A. Persons installing stormwater storage facilities shall be required to pay a specified amount to the Municipal Stormwater Maintenance Fund to help defray costs of periodic inspections and maintenance expenses. The amount of the deposit shall be determined as follows:
 - 1. If the storage facility is to be privately owned and maintained, the deposit shall cover the cost of periodic inspections performed by the municipality for a period of ten (10) years, as estimated by the municipal engineer. After that period of time, inspections will be performed at the expense of the municipality.
 - 2. If the storage facility is to be owned and maintained by the municipality, the deposit shall cover the estimated costs for maintenance and inspections for ten (10) years. The municipal engineer will establish the estimated costs utilizing information submitted by the applicant.
 - 3. The amount of the deposit to the fund shall be converted to present worth of the annual series values. The municipal engineer shall determine the present worth equivalents which shall be subject to the approval of the governing body.
- B. If a storage facility is proposed that also serves as a recreation facility (e.g., ballfield, lake), the municipality may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purposes.
- C. If in the future a storage facility (whether publicly or privately owned) is eliminated due to the installation of storm sewers or other storage facility, the unused portion of the maintenance fund deposit will be applied to the cost of abandoning the facility and connecting to the storm sewer system or other facility. Any amount of



the deposit remaining after the costs of abandonment are paid will be returned to the depositor.



ARTICLE VI STORMWATER PLAN REQUIREMENTS

Section 601 - General Requirements

No final subdivision/land development plan shall be approved, no permit authorizing construction shall be issued, or an earth moving or land disturbance activity initiated until the final stormwater management plan for the site is approved in accordance with the provisions of this ordinance.

Section 602 - General Exemptions

The following activities are specifically exempt for the plan preparation provisions of this Ordinance unless the municipality determines that the activity is likely to, has, or will negatively impact the purposes and objectives set forth in Article I. For example, where an activity occurs on very steep terrain or where an activity is the latest in a series of incremental developments expected to cause pronounced stormwater impacts, it may be that these activities will be required to comply with the plan preparation requirements contained herein even though their activities qualify under the listing in this section. Upon making such determination, the municipality shall give notice in writing to the land owner and the developer, if known, and direct the landowner and any developer to immediately cease and desist all activity and affirmatively comply with the formal plan, submission, and approval procedures of this ordinance. Exemption shall not relieve the applicant from providing adequate stormwater management to meet the purpose of this Ordinance.

- A. Any regulated activity that would create 10,000 square feet or less of impervious area. This criteria shall apply to the total development even if development is to take place in phases.
- B. Land disturbances associated with existing one and two family dwellings provided that the activities will not create in excess of 10,000 square feet of impervious area.
- C. Use of land for gardening for home consumption.
- D. Agriculture when operated in accordance with a conservation plan or erosion and sedimentation control plan prepared by the County Conservation District. The agricultural activities such as growing crops, rotating crops, filling of soil and grazing animals and other such activities are specifically exempt from complying with the requirements of this Ordinance when such activities are conducted in accordance with a conservation plan prepared by the Erie County Conservation District. The construction of buildings, parking lots or any activity that may result in impervious surface which increases the rate and volume of stormwater runoff shall comply with the requirements of this Ordinance.
- E. Forest management operations which are following the Department of Environmental Protection's management practices contained in its publication "Soil



Erosion and Sedimentation Control Guidelines for Forestry" and are operating under an erosion and sedimentation control plan.

Section 602 - Exemptions

- A. The following activities are exempt from the stormwater management plan preparation provisions of this Ordinance. Exemption shall not relieve the applicant from providing adequate stormwater management to meet the purpose of this Ordinance.
 - 1. Any regulated activity that would create 10,000 square feet or less of impervious area. This criteria shall apply to the total development even if development is to take place in phases. Impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks. Any areas designed to initially be gravel or crushed stone shall be assumed to be impervious for the purposes for the purpose of this exemption criteria. (Note: Municipalties may utilize a more stringent exemption criteria (i.e. < 5,000 square feet) if they so desire)
 - 2. Land disturbance associated with existing one and two family dwellings.
 - 3. Use of land for gardening for home consumption.

Section 603 - Stormwater plan Contents

- A. General Format: The stormwater plan shall be drawn to a scale of not less than 1 inch = 200 feet. All sheets shall contain a title block with; Name and address of applicant and engineer, scale, north arrow, legend and date of preparation.
- B. Existing and Proposed Features: The plan shall show the following under both predevelopment and post-development conditions:
 - 1. Watershed location Provide a key map showing the location of the development site within the watershed(s) and watershed subarea(s). On all site drawings, show the boundaries of the watershed(s) and subarea(s) as they are located on the development site and identify watershed names(s) and subarea number(s).
 - 2. Floodplain boundaries Identify 100-year floodplains on the development site (as appropriate) based on the municipal Flood Insurance Study maps.
 - 3. Natural features Show all bodies of water (natural or artificial), watercourses (permanent and intermittent), swales, wetlands and other natural drainage courses on the development site, or which will be affected by runoff form the development.



- 4. Soils Provide an overlay showing soil types and boundaries within the development site (consult county, SCS and U.S. Geological Survey for information).
- 5. Contours Show existing and final contours at intervals of two (2) feet; in areas with slopes greater than fifteen (15) percent, five (5) foot contour intervals may be used.
- 6. Land cover Show existing and final land cover classifications as necessary to support and illustrate the runoff calculations performed.
- 7. Drainage area delineations Show the boundaries of the drainage areas employed in the runoff calculations performed.
- 8. Stormwater management controls Show any existing stormwater management or drainage controls and/or structures, such as storm sewers, swales, culverts, etc. which are located on the development site, or which are located off-site but will be affected by runoff from the development.
- C. <u>Professional certification</u>: The principal in charge of preparing the stormwater management plan (including all calculations) shall be a registered professional engineer or registered land surveyor and the stormwater management plan shall be sealed by a registered professional engineer or professional land surveyor with training and expertise in hydrology and hydraulics. Documentation of qualifications may be required by the municipality.
- D. <u>Runoff calculations</u>: Calculations for determining pre- and post-development discharge rates and for designing proposed stormwater control facilities must be submitted with the stormwater management plan. All calculations shall be prepared using the methods and data prescribed by Section 102 of this Article.
- E. <u>Stormwater controls</u>: All proposed stormwater runoff control measures must be shown on the plan including methods for collecting, conveying and storing stormwater runoff on-site, which are to be used both during and after construction. Erosion and sedimentation controls shall be shown in accordance with Section 104 of this Article. The plan shall provide information on the exact type, location, sizing, design and construction of all proposed facilities and their relationship to the existing watershed drainage system. The plan shall include technical specifications for materials and methods to be used in the construction of the stormwater management facilities.
 - 1. If the development is to be constructed in stages, the applicant must demonstrate that stormwater facilities will be installed to manage stormwater runoff safely during each stage of development.
 - 2. A schedule for the installation of all temporary and permanent stormwater control measures and devices shall be submitted.



- 3. If appropriate, a justification should be submitted as to why any preferred stormwater management techniques, as listed in Section 103, are not proposed for use.
- F. <u>Easements, right-of-ways, deed restrictions</u>: All existing and proposed easements and rights-or-way for drainage and/or access to stormwater control facilities shall be shown along with any areas subject to special deed restrictions relative to or affecting stormwater management on the development site.
- G. Other permits/approvals: A list of any approvals/permits relative to stormwater management that will be required from other governmental agencies (Pennsylvania DEP Chapter 105 and 106 permits and/or NPDES permit) and anticipated dates of submission/receipt should be included with the stormwater plan submission. Copies of permit applications may be requested by the municipality where they may be helpful for the plan review.
- H. <u>Maintenance program</u>: The proposed maintenance plan for all stormwater control facilities shall:
 - 1. Identify the proposed ownership entity (e.g., municipality, property owner, private corporation, homeowner's association, or other entity).
 - 2. Identify the type of maintenance, probable frequencies, personnel and equipment requirements and estimated annual maintenance costs.
 - 3. Identify the method for financing the continuing operation and maintenance of the facility if the facility is to be owned by other than a governmental agency.
 - 4. Include copies of any legal agreements required to implement the maintenance program and, if applicable, copies of the maintenance agreement as required by Section 105 of this Article.
- I. <u>Financial guarantees</u>: Submit financial guarantees in accordance with the provisions of Section 111 of this Article.
- J. Evidence of notification of downstream municipality: The developer shall notify (by certified mail) the municipality immediately downstream of the municipality within which the development is proposed that a stormwater control plan has been prepared and submitted. This letter should identify the location of the proposed development site and the name of the affected stream. The developer shall submit a copy of this letter and a copy of the certified mail return receipt.



ARTICLE VII PLAN REVIEW PROCEDURES

Section 7.01 - Pre-application Phase

- A. Before submitting the stormwater plan, applicants are urged to consult with the municipality on the applicable regulations and techniques for safely managing runoff from the development site. The municipality may also be helpful in providing necessary data for the stormwater management plan.
- B. Applicants are encouraged to submit a sketch plan with a narrative description of the proposed stormwater management controls for general guidance and discussion with the municipality and other agencies.
- C. The pre-application phase is not mandatory; any review comments provided by the municipality are advisory only and do not constitute any legally binding action on the part of the municipality.

Section 7.02 - Stormwater Plan Reviews

- A. <u>Submission of plans</u>: Stormwater plan applications shall be submitted with the preliminary and final subdivision/land development applications.
- B. <u>Notification of affected municipalities</u>: The developer is required to notify municipalities immediately downstream of the development site that a stormwater control plan has been submitted. Copies of the plans will be made available to the municipalities upon request. Comments received from any affected municipality will be considered by the municipal engineer and county agencies in their reviews.
- C. <u>Municipal engineer's review</u>: The municipal engineer shall recommend approval or disapproval of the stormwater management plan based on the requirements of the municipal ordinances, the standards and criteria of the watershed plan and good engineering practice. The engineer shall submit a written report, along with supporting documentation, stating their reasons for approval or disapproval.

(Note: 1) If the municipal Planning Commission has the final authority for approving plans, then this section should be changed as appropriate.)

E. <u>Permits required from other governmental agencies</u>: Where the proposed development requires an obstruction permit from the Pennsylvania DEP or an erosion/sedimentation permit from the County Conservation District, final stormwater management plan approval shall be granted subject to the receipt of such permits. No building permit shall be issued, nor construction started, until the permits are received and copies filed with the municipality.

Section 703 - Status of the Stormwater Plan after Final Approval



- A. Upon final stormwater plan approval, receipt of all necessary permits, and recording of the final subdivision or land development plan in the Erie County Recorder of Deeds Office, the applicant may commence to install or implement the approved stormwater management controls.
- B. If site development or building construction does not begin within two years of the date of final approval of the stormwater management plan, then before doing so, the applicant shall resubmit the stormwater management plan to verify that no condition has changed within the watershed that would affect the feasibility or effectiveness of the previously approved stormwater management controls. Further, if for any reason development activities are suspended for two years or more, then the same requirement for resubmission of the stormwater management plan shall apply.

Section 704 - Stormwater Plan Modifications

- A. If the request for a plan modification is initiated <u>before</u> construction begins, the stormwater plan must be resubmitted and reviewed according to the procedures contained in Section 107 above.
- B. If the request for a plan modification is initiated <u>after</u> construction is underway, the municipal engineer shall recommend approval or disapproval of the modification based on field inspection <u>provided</u>: (1) the requested changes in stormwater controls do not result in any modifications to other approved municipal land use/development requirements (e.g., building setbacks, yards, etc.) and (2) the performance standards in Section 102 are met. Notification of the engineer's action shall be sent to the governing body which may issue a stay of the plan modification within fourteen (14) days and require the permittee to resubmit the plan modification for full stormwater plan review in accordance with Section 107 above.



ARTICLE VIII INSPECTIONS OF STORMWATER MANAGEMENT CONTROLS

Section 8.01 - Inspections

- A. The municipal engineer or a designated representative of the municipality shall inspect the construction of the temporary and permanent stormwater management system for the development site. The permittee shall notify the municipal engineer 48 hours in advance of the completion of the following key development phases:
 - 1. At the completion of preliminary site preparation including stripping of vegetation, stockpiling of topsoil and construction of temporary stormwater management and erosion control facilities.
 - 2. At the completion of rough grading but prior to placing topsoil, permanent drainage or other site development improvements and ground covers.
 - 3. During construction of the permanent stormwater facilities at such times as specified by the municipal engineer.
 - 4. Completion of permanent stormwater management facilities including established ground covers and plantings.
 - 5. Completion of final grading, vegetative control measures or other site restoration work done in accordance with the approved plan and permit.
- B. No work shall commence on any subsequent phase until the preceding one has been inspected and approved. If there are deficiencies in any phase, the municipal engineer shall issue a written description of the required corrections and stipulate the time by which they must be made.
- C. If during construction, the contractor or permittee identifies any site condition, such as subsurface soil conditions, alterations in surface or subsurface drainage which could affect the feasibility of the approved stormwater facilities, he/she shall notify the municipal engineer within 24 hours of the discovery of such condition and request a field inspection. The municipal engineer shall determine if the condition requires a stormwater plan modification.
- D. In cases where stormwater facilities are to be installed in areas of landslide-prone soils or other special site conditions exist, the municipality may require special precautions such as soil tests and core borings, full-time inspectors and/or similar measures. All costs of any such measures shall be borne by the permittee.



ARTICLE IX FINANCIAL GUARANTEES AND DEDICATION OF PUBLIC IMPROVEMENTS

Section 9.01 - Financial Guarantees

- A. <u>Guarantee of completion</u>: A completion guarantee in the form of a bond, cash deposit, certified check or other negotiable securities acceptable to the municipality, shall be filed. The guarantee shall cover all streets, sanitary sewers, stormwater management facilities, water systems, fire hydrants, sidewalks and other required improvements; it shall be in the amount and form prescribed by the Pennsylvania Municipal Planning Code (Section 509).
- B. <u>Release of completion guarantee</u>: The procedures for requesting and obtaining a release of the completion guarantee shall be in a manner prescribed by the Pennsylvania Municipalities Planning Code (Section 510).
- C. <u>Default of completion guarantee</u>: If improvements are not installed in accordance with the approved final plan, the governing body may enforce any corporate bond or other security by appropriate legal and equitable remedies. If proceeds of such bond or other security are insufficient to pay the cost of installing or making repairs or corrections to all the improvements covered by said security, the governing body may at its option install part of such improvements in all or part of the development and may institute appropriate legal or equitable action to recover the moneys necessary to complete the remainder of the improvements. All proceeds, whether resulting from the security or from any legal or equitable action brought against the developer, or both, shall be used solely for the installation of the improvements covered by such security and not for any other municipal purpose.

Section 9.02 - Dedication of Public Improvements

- A. When streets, sanitary sewers, stormwater management facilities, water lines or other required improvements in the development have been completed in accordance with the final approved plan, such improvements shall be deemed private until such time as they have been offered for dedication to the municipality and accepted by separate ordinance or resolution or until they have been condemned for use as a public facility.
- B. Prior to acceptance of any improvements or facilities, the municipal engineer shall inspect them to ensure that they are constructed in accordance with the approved plan and are functioning properly. In the case of any stormwater control facility, it must be free of sediment and debris.
- C. The owner shall submit as-built plans for all facilities proposed for dedication.
- D. Prior to acceptance of any improvements or facilities, the applicant shall provide a financial security to secure the structural integrity and functioning of the improvements. The security shall: (1) be in the form of a bond, cash, certified check or other negotiable securities acceptable to the municipality, (2) be for a term



of 36 months, and (3) be in an amount equal to 25 percent of the actual cost of the improvements and facilities so dedicated.

(Note: The duration and amount of the security may be established at the discretion of the municipality.)



ARTICLE X FEES

Section 1001 - Fee Schedule

The municipal governing body may adopt by resolution from time to time a reasonable schedule of fees to cover the cost of plan reviews, inspections and other activities necessary to administer the provisions of this ordinance. All fees shall be set in accordance with the applicable provisions of the Pennsylvania Municipalities Planning Code and any dispute over the fee amount shall be resolved in the manner prescribed by the Pennsylvania Municipalities Planning Code.



ARTICLE XI ENFORCEMENT PROCEDURES AND REMEDIES

Section 1101 - Right of Entry

Upon presentation of proper credentials, duly authorized representatives of the municipality may enter at reasonable times upon any property to investigate or ascertain the condition of the subject property in regard to an aspect regulated by this ordinance.

Section 1102 - Notification

In the event that the applicant, developer, owner or his/her agent fails to comply with the requirements of this ordinance or fails to conform to the requirements of any permit, a written notice of violation shall be issued by the municipal engineer or any designated municipal official. Such notification shall set forth the nature of the violations(s) and establish a time limit for correction of the violation(s). Upon failure to comply within the time specified, unless otherwise extended by the municipality, the applicant, developer, owner or his/her agent shall be subject to the enforcement remedies of this ordinance.

Section 1103 - Preventive Remedies

- A. In addition to other remedies, the municipality may institute and maintain appropriate actions by law or in equity to restrain, correct or abate a violation, to prevent unlawful construction, to recover damages and to prevent illegal occupancy of a building or premises.
- B. In accordance with the Pennsylvania Municipalities Planning Code (Sec. 515.1), the municipality may refuse to issue any permit or grant approval to further improve or develop any property which has been developed in violation of this ordinance.

Section 1104 - Enforcement Remedies

- A. Any person, who has violated or permitted the violation of the provisions of this Ordinance shall, upon being found liable therefor in a civil enforcement proceeding commenced by the municipality, pay a fine of not less than \$_____ and not more than \$_____ plus court costs, including reasonable attorney fees incurred by the municipality. No judgment shall commence or be imposed, levied or be payable until the date of the determination of a violation by the district justice.
- B. If the defendant neither pays nor timely appeals the judgment, the municipality may enforce the judgment pursuant to applicable rules of civil procedure.
- C. Each day that a violation continues shall constitute a separate violation unless the district justice further determines that there was a good faith basis for the person violating the ordinance to have believed that there was no such violation. In such case there shall be deemed to have been only one such violation until the fifth day



- following the date of the district justice's determination of a violation; thereafter each day that a violation continues shall constitute a separate violation.
- D. All judgments, costs and reasonable attorney fees collected for the violation of this Ordinance shall be paid over to the municipality.
- E. The court of common pleas, upon petition, may grant an order of stay, upon cause shown, tolling the per diem fine pending a final adjudication of the violation and judgment.
- F. Nothing contained in this section shall be construed or interpreted to grant to any person or entity other than the municipality the right to commence any action for enforcement pursuant to this section.

Section 1105 - Additional Remedies

In addition to the above remedies, the municipality may also seek remedies and penalties under applicable Pennsylvania statutes, or regulations adopted pursuant thereto, including but not limited to the Storm Water Management Act (32 P.S. Section 693.1-693.27) and the Erosion and Sedimentation Regulations (25 Pennsylvania Code, Chapter 102). Any activity conducted in violation of this ordinance or any Pennsylvania approved watershed stormwater management plan may be declared a public nuisance by the municipality and abatable as such.



Appendix A Assigned Release Rate Percentages

Release Rate Area	Assigned Release	Release Rate Area	Assigned Release		
Identification	Rate Percentage	Identification	Rate Percentage		
Number		Number	C		
1	100	26	90		
2	80	27	80		
3	90	28	80		
4	80	29	90		
5	70	30	80		
6	90	31	80		
7	80	32	90		
8	80	33	80		
9	90	34	90		
10	80	35	70		
11	80	36	80		
12	80	37	80		
13	80	38	90		
14	80	39	90		
15	70	40	80		
16	90	41	90		
17	90	42	70		
18	80	43	80		
19	80	44	80		
20	80	45	70		
21	90	46	90		
22	70	47	80		
23	100	48	80		
24	80	49	80		
25	80	50	70		

Note: Release Rate Identification Numbers refer to numbers indicated on the Release Rate Percentage Map.





MODEL ORDINANCE FOR AMENDING EXISTING ORDINANCES TO REFERENCE AND INCLUDE THE PROVISIONS OF THE STORMWATER MANAGEMENT PLAN

An Ordinance amending [municipal name] Ordinance No known as the [name of ordinance], in order to reference and include the provisions of the Lake Erie / Elk Creek Watershed Stormwater Management Plan.
WHEREAS, the [name of municipal governing body] has recommended to amend [municipal name] Ordinance No, known as the [name of ordinance] in order to include and reference the provisions of the Lake Erie / Elk Creek Watershed Stormwater Management Plan; and
WHEREAS, the [municipal name] Planning Commission after public hearing and due notice, has recommended that [name of municipality] Ordinance No be amended as set forth herein; and
WHEREAS, after due and timely notice by publication, as required by law, public hearing upon the proposed amendment making the change as set forth herein;
NOW, THEREFORE, BE IT ORDAINED AND ENACTED, by the [name of municipal governing body] of [municipal name], Erie County, Pennsylvania, that {municipal name} Ordinance No, known as the {name of ordinance}, be hereby amended as follows:
Section [specify section being created] which reads as follows, be added to the [name of ordinance]:
In addition to the requirements of this ordinance, all subdivision and land development activity shall comply with the provisions of Ordinance No, known as the [number and name of the municipality's stormwater management ordinance].
[The following sections should be added if the stormwater ordinance does not include them. Note the that the model stormwater management ordinance contains these provisions.]
Section Any Ordinance or provisions of any Ordinance inconsistent with the provisions of the stormwater requirements of this Ordinance are hereby repealed to the extent of the inconsistency only.
Section Any provision, section, subsection, sentence, clause, phrase, or portion thereof which is declared invalid by a court of competent jurisdiction, such holdings shall not be construed as to affect the validity of any other provision, section, sentence, clause, or phrase of the remaining provisions.



It is ne	reby	declared	that	tne	legislative	intent	was	that	this	Ordinance	would	have	been	adopted	had	such
invalid	provi	isions of	its ap	plic	ation not b	een in	clude	d he	rein.							
	-		_	-												

	[Name of municipal governing body]
	[name and title]
	[name and title]
	[name and title]
Attest:	
[name], Secretary (type or print)	
I hereby certify that the foregoing Ordin on [date], a newspaper of general circulation in the munic forth at the regular meeting of the [name of municipal gov	
•	[name], Secretary



